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# Air-to-Ground Proceeding

## WT Docket No. 03-103

### Presentation to FCC

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September 13, 2004

# Fundamentals for ATG success

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- For successful ATG communications in commercial airlines...
  - Passengers should be able to use their cell phone, PDA and other devices the same way they use them on the ground
  - Passengers and airlines want ONLY broadband, NO narrowband
  - Cost-effective broadband ATG network is needed to offer attractive pricing for end users
  - Competition is required to avoid artificially high prices
- Satellite communication costs are too high and NO competition to ground-based ATG networks
  - Boeing advocating competitive terrestrial ATG service is a testament to this

# ATG Licensing proposals

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- AirCell's position: Minimum of two and up to four broadband service providers
  - Practical and advantageous
  - Provides competition
  - Four licensees, each with same broadband capacity, data rates and user experience
  - View shared by Boeing
- AirCell disagrees with exclusive A/B (2.5/1.5 MHz) proposal

# Exclusive A/B proposal

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- **Broadband MONOPOLY**
  - Viable broadband in A block only
- **B-Block is virtually useless**
  - No cost-effective broadband technology available in 750KHz
  - Even if one were to develop, there is unfair head-start for the A-block licensee
  - Narrowband technology incapable and insufficient of addressing commercial airlines passenger demand
- **Potential for one company to obtain monopoly**
- **Underutilization of spectrum**
  - Two to four broadband service providers can be accommodated

# Data rates and user experience

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- As of today, AirCell finds EVDO to be the ideal ATG broadband technology
  - EVDO has 1.25MHz x 2 bandwidth requirements, N=1 re-use
  - Peak data rates of 3.1Mbps and 1.8Mbps on forward and reverse links respectively
  - Low latency, large cell radius, tolerance to doppler
  - Ideally suited for asymmetric data traffic
- Passenger traffic from different applications
  - Web browsing, email, ftp, etc.
  - Internet data traffic is very asymmetric and bursty in nature
  - Various models for traffic exist: self-similar network, Poisson, others

# Data rates and user experience

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- Each user feels like they own the pipe
  - Due to low data-activity rate and bursty nature of data traffic
  - Peak rate available to each user when they want to send/receive
  - Experience similar to or better than a typical “hot-spot” with T1 access into the internet
- Telcordia’s comments are completely misleading
  - Inter-system interference impacts are minimal (<2% reduction in data rates)
  - Apple-to-apple, same scenario/same parameters comparison will produce same results
  - In prior AirCell simulations, 48 Kbps was used as an example to demonstrate isolation

# Comments on Airfone/Telcordia filings

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- Need for higher transmit power on aircraft
  - To address growth in the market/traffic, cell splitting is used
    - Solution is NOT to increase transmit power of mobiles
  - Transmit power levels used by AirCell as exactly same as what is used in terrestrial systems with a much worse path loss link
    - Transmit power levels can be changed/increased to reasonable levels so long as the benefits outweigh the disadvantages
  - Airfone/Telcordia simulation includes totally fabricated assumptions of average power being 3dB less than the peak
    - 43dBm (20 Watts) peak mobile power is not used in any EVDO systems in the world today.
    - It is not realistic that any broadband system will be developed in the future that will require 20 Watt mobile transmit power to achieve high data rates.

# Comments on Airfone/Telcordia filings

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- **BTS separation rules**
  - With reverse banding proposed by AirCell, there are no rules required for BTS separation
  - Given the ATG environment and number of cells needed throughout USA, there is more than enough real estate for operators to locate cells without interfering with each other
- **25dB roll-off in 1° not required for BTS antenna**
  - It is based on false assumptions by Airfone/Telcordia that planes fly at 1000 ft altitude, 12.5 miles from airport
- **Naval radar interference**
  - It is a low probability event
  - Per Telcordia's information provided, Airfone's BTS and aircrafts should be affected to the same extent; it is a problem with similar effects on today's system and reverse banding approach

# Shortcomings of Airfone simulation

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- Unrealistic and false mobile transmit power assumptions
- No reverse link rates provided
  - Statements are made that “higher data rate requires higher power transmissions”, yet no analysis on reverse link power, data rates
  - No data provided for 23dBm transmit power used by EVDO
- Simulation focus and structure is invalid
  - No data provided for Data rates (user experience) under 1 service provider assuming that operator has to serve 100% of the market (effect of user concentration per cell)
- Simulation is skewed to show pre-determined results

# Future growth and technology evolution

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- AirCell's proposal provides two and four independent, broadband systems
- Each operator has complete flexibility for technology choice and evolution
- Capacity and data rates are more dependent on technology capability, number of users, inter-cell interference, cell/sector size, etc.
  - Inter-system interference effects on data rates are minimal (<2%)
  - Above factors are same for a single or multiple licensee scenario

# Future growth and technology evolution

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- Operator typically address capacity demands through cell splitting/addition
- Diminishing marginal capacity increase with cell splitting
  - Technical and economic payoff decreases
- AirCell's proposal offer superior solution
  - Spreads market demand among service providers enabling them to operate at optimum cell capacity points
  - Customers get best user experience and pricing from competition
  - Multiple system scenario offer better technical and business efficiency

# Summary and Conclusions

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- AirCell's two and four licensee proposals offer superior solution
  - Practical and advantageous
  - Provide competition
  - Provide broadband systems with complete flexibility
  - Provide required user experience and data rates
  - Provide superior technical and business efficiency